23229

AMENDED SPECIFICATION

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PATENT SPECIFICATION

DRAWINGS ATTACHED

716,783

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No. 8624/50.

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Index at acceptance:—Class 94(1), C3(A1: C5), F19.

COMPLETE SPECIFICATION

Improvements in Packaging Machines

I, LEOPOLD RADO, of 6, Stanley Crescent, London, W.11, a British subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention has for its subject a machine for the continuous production of pliable, filled and air-tightly sealed containers from a filled tubing made of thermoplastic material, comprising a conveyor consisting of two endless conveyor members, both adapted to advance continuously at the same uniform speed and in constant direction, one strand of one conveyor member being opposed to a co-operating strand of the other conveyor member and being parallel thereto at least along a fraction of their length, pressing means transversely arranged and secured to each of the conveyor members at distances from one another which are equal to the length of the containers to be produced, the said pressing means on one conveyor member being maintained in registration with the opposed pressing means on the other conveyor member as they move along said opposed strands, the opposed registering pressing means being caused to approach one another during their movement along said opposed strands, so that the walls of the filled tubing introduced between them are gradually brought into close contact with one another and thereafter, to exert pressure on said contacting walls and means being provided for heating said pressing means or causing them to generate heat to weld the pressed parts of the tubing during their movement, the length of the movement of the pressing means during which the pressure is maintained being greater than the length of an individual container.

The pressing members may be heated only from a point of their travel beyond that where the walls of the tubing have been brought into close contact under pressure and for a time sufficient for welding the pressed parts together.

An essential feature of the invention is that the pressing means secured to each of the conveyor members are provided transversely on said conveyor members, at distances from one another that are equal to the length of the containers to be produced. The machine may comprise guiding members for the pressing means along the strands of the conveyor members, said guiding members being provided in substantial parallelism with the co-operating parallel conveyor member strands.

Each guiding member has preferably a shape such that the pressing members carried by one co-operating strand move gradually nearer the pressing members registering therewith carried by the other co-operating strand when they are about to reach the parallel fractions of their length.

The pressure exerted by the pressing means is provided through the agency of mechanical devices.

Means are provided for limiting the movement of the registering pressing means towards one another so that they cannot come into contact, these means being preferably adjustable.

In order to prevent any longitudinal shifting between the registering pressing means on the two conveyor members, the pressing means on one conveyor member aer provided with guiding means adapted to engage the registering pressing means on the other conveyor member.

[*Price*

The heating by the pressing means may be performed through electrical means, and more especially through high frequency currents, or electrical impulses.

In the case of the heating being provided through electrical means, the pressing means on either conveyor member are electrically conductive and co-operate with corresponding portions of the guiding members that are also conductive and insulated with reference to the remainder of the guiding members, said conductive portions of the guiding members for both strands being inserted in a common operative circuit.

To prevent the formation of sparks when the pressing means approach or leave the electrically conductive portions of the guiding members, the pressing means on at least one strand are provided each with a pusher member adapted to engage a switch in the common operative circuit to close the latter only when the pressing means have entered into complete mechanical contact with the co-operating conductive portions of the guiding members and to open said circuit before the said pressing means have reached the end of the corresponding conductive portions.

If the heating means are of electrical nature, the movement limiting means are constituted by an abutment that is not electrically conductive and is provided on both sides of at least one of the pressing means of each registering pair, and the guiding members which are provided to keep the pressing means in relative position when registering are also electrically insulated.

The machine includes means adapted to increase the pressure exerted by the registering pressing means on the tubing during their travel at those points where the welding is performed.

For instance the guiding members may have a shape such that they provide for a movement of the registering pressing means towards one another to increase the pressure exerted on the tubing by said pressing means.

In a further development, the machine may be provided with a cutter member, that is normally in its receded position inside one of each pair of registering pressing means and is urged out of same and into a corresponding slot in the other registering pressing means through the welded part of the tubing held between said pressing means to sever said welded part of the tubing, said movement of the cutter member being provided by means of a cam located beyond the point of the travel of the tubing at which the part considered thereof has been welded.

The filled tubing may be pressed and sealed both on longitudinal areas throughout its length and on transverse areas at distances apart equal to the length of an individual container.

The cutting of the welded areas of the filled tubing is executed while said areas are still held under pressure.

A better understanding will be obtained for the invention through the following detailed disclosure, given with reference to the accompanying drawings shown only as an example and in which: —

Figure 1 is a diagrammatic view of the essential parts of a machine in accordance with the invention.

Figure 2, 3 and 4 are diagrammatic sectional views of the pressing means while respectively pressing, welding and cutting the filled tubing.

Figure 5 is a diagrammatic front view of two registering pressing means, one of them being provided with non-electrically conductive abutments for limiting the movement of said pressing means towards one another.

Figure 6 is a similar diagrammatic view showing the pressing means in the position nearest to one another.

Figure 7 is a partial diagrammatic view of an adjustable abutment for limiting the movement of the pressing means towards one another.

Figure 8 is a simplified perspective view of one pressing means on one conveyor member provided with guiding elements to keep the corresponding pressing means of the other conveyor member in their correct relative position.

Figure 9 is a diagrammatic lateral view showing how the pressing means of one conveyor member fit with the corresponding pressing means of the other conveyor member.

Figures 10, 11 and 12 are diagrammatic views showing how the pushing member provided on each pressing means of one conveyor member switches on and off the current as the pressing means engage and leave the conductive portion of the guiding member.

Figure 13 is a diagrammatic view of a part of a machine in accordance with the invention, fitted with an equipment to divide a tubing lengthwise.

Figure 14 shows somewhat diagrammatically how the current of an electric impulse generator is switched on as shown in Figure 1. It is the same mechanism as that used for switching on the high frequency generator as shown in Figure 1.

The machine illustrated in Figure 1 comprises chiefly two endless conveyor members 1 and 2 passing respectively over the driving wheels 3—4 and 5—6.

The opposed strands 1*a* and 2*a* of the conveyor members 1 and 2 are parallel over a substantial part of their length and said two strands advance in the same direction and with the same speed.

Each conveyor member 1 and 2 carries a series of presser members 7 and 8 respectively separated from one another by lengths equal to those of the containers that it is desired to obtain.

When the presser members 7 and 8 of the two conveyor members are carried along the opposed parallel strands 1*a* and 2*a* of said conveyor members by reason of their movement round the driving wheels 3—4 and 5—6, the presser members 7 move exactly in register with the presser members 8. The space separating the presser members 7 from the presser members 8 along the strands 1*a* and 2*a* is such that the tubing of thermoplastic material 9 filled with material and brought between said strands 1*a* and 2*a* is carried along and gradually held between the members 7 and 8 while its walls are brought gradually into intimate contact with one another and pressed together. The material contained in the tubing is a fluid substance and is, when the walls are thus pressed into intimate contact, urged completely away to either side of the pressed parts. Pressure is maintained to hold the said pressed parts of the walls in intimate contact while the pressing means move through a length of movement which is greater than the length of an individual container to be produced.

The presser members 7 and 8 are guided respectively in their travel along the strands 1*a* and 2*a* by guiding slopes 10 and 11 on which they bear, said slopes being substantially parallel to the strands 1*a* and 2*a*.

The machine may include means for heating the presser tools 7 and 8 when said tools arrive at a point in their travel between the parallel opposed parts of the strands 1*a* and 2*a* and the walls of the tubing have been brought into intimate contact with one another after the contents of the tubing, the fluid substance, has been completely driven away to either side of pressed parts, said heating being provided to weld the walls of the tubing at the points required.

Obviously, this heating of the presser members may be executed through any suitable means.

In the example illustrated in the drawing, however, the heating of the pressed part of the tubing by the presser members is executed by electrical means, in the present case by high frequency current. The presser members are made of electrically conductive material and form the electrodes. The guiding slopes 10 and 11 are insulated but included in each is a metal plate 12 or 13 connected respectively with the poles of the generator of high frequency current, whereby when two corresponding presser members arrive simultaneously in contact with said metal plates, they are inserted in the electric circuit. However, in order to avoid the formation of sparks when the presser members enter into engagement with the metal plates 12 and 13 or move out of engagement with reference thereto, it is necessary that the electrical contact be established only when the mechanical contact has been perfectly and completely established between the presser members and the metal plates. To this purpose, each presser member 7 is rigid with a cam or pusher member 14 (Figs. 10 to 12) that acts on a switch 15 inserted in the electric circuit so as to close the circuit only when the presser member 7 is in contact throughout its contacting surface with the metal plate 12 and to open this same circuit before the presser member 7 has reached the end of said metal plate.

Figure 10 shows the relative positions of the presser member 7 and of the metal plate 12 at the moment of the closing of the circuit. Figure 11 illustrates the relative positions of these same parts during the closing of the circuit. Lastly, Figure 12 shows the relative positioning of these parts at the moment at which the circuit is opened again.

When the tube walls that are held pressed between the presser members 7 and 8 are heated by reason of the electrical impulse produced by the closing of the circuit, the thermoplastic material forming them softens and becomes adherent so as to provide for the welding of the pressed parts. As a consequence of this softening, the tube or tubing walls that are held pressed between the presser members offer a less considerable resistance and are flattened to a greater extent between the said presser members.

It is therefore necessary for said presser members to come nearer one another at this moment. In the example illustrated in the drawing, the movement of the presser tools 7 and 8 towards one another is effected by the special shape given to the sloping guides 10 and 11.

Figures 2 and 3 illustrate diagrammatically in cross-section the action of the outline of the slopes 10 and 11 on the presser tools 7 and 8.

Each presser member 7 is constituted chiefly by an electro-conductive part 7*a* which constitutes the actual presser part of the presser member and which is held in position by a compression spring 16 housed inside a casing 17. As long as the presser member bears against the initial part of the sloping guide 10 shown in Fig. 2, the spring 16 only serves for holding the part 7*a* of the presser member in position. But when the presser member reaches the portion of said slope that includes the metal portion connected electrically with the current generator, the spring 16 is compressed and the part 7*a* of the presser member then exerts on the wall of the tube a pressure that is determined by the strength of the spring 16 (Figure 3).

It is necessary to limit the movement of the presser members 7 and 8 towards one another in order to prevent them on one hand from exerting a pressure that is too considerable on the tube and, on the other hand, from coming into contact with one another and producing a short circuit. To this end, the presser members of at least one of the conveyor

members are provided laterally, as shown in Figures 5 to 7, with stops 18 of insulating material the thickness of which defines the minimum spacing between the members 7 and 8. Said spacing may moreover be adjusted by means of a screw 19 if the stop is carried slidingly on the presser member, as illustrated in Figure 7.

In order to keep, during the heating operation, the contents of the tube away from immediate proximity of the heated part that is consequently soft, and thus in order to cut out any risk of the tube breaking as a consequence of the pressure prevailing inside the closed portion of the tubing, the front and rear surfaces of the presser members are provided with insulated parts 7*b* (Figures 2 to 4) adapted to slide over said surfaces against the action of the springs 7*c* so as to engage the tube to either side of the heated softened part lying between the electro-conductive parts 7*a* of the presser members.

It is essential furthermore for the proper operation of the machine that the presser members 7 of one of the conveyor members may register exactly with the corresponding presser members 8 of the other conveyor member, cutting out any sliding of one of them with reference to the other chiefly in the direction of progression of the tube. To this purpose, the members 8 for instance are provided laterally with guides 20 (figures 8 and 9) assuming a flaring shape and allowing the corresponding members 7 to be fitted exactly in register with the members 8 and to hold them in position during their travel along the opposed parallel strands of the conveyor members. Obviously if electric current is used as heating means, said guiding members 20 should be made of insulating material or else they should be insulated with reference to the body of the presser member.

In the example illustrated in the drawing, the presser exerted on the pressed portions of the tube is generated by means of mechanical arrangements. It is obvious that said pressure may be obtained from pneumatic, hydraulic, electromagnetic and the like arrangements and it is possible to provide for an increase of said pressure at the point at which the heating is performed, for instance by means of cams controlling at the desired moment the opening or the closing of auxiliary pneumatic or hydraulic circuits, or else through the action of electromagnetic relays.

The machine includes also an arrangement providing for the cutting of the welded parts of the tube with a view to the formation of separate containers, said cutting being performed preferably while the welded parts of the tube are still held under pressure between the presser members. To this purpose, a cutter 21 (Figs. 2 to 4) is housed in a slot 21*a* of one of the presser members, 7 for instance, said cutter being held normally in its inoperative position inside said slot. A cam 23 positioned in the path of the travel of the presser members 7 beyond the point at which the tube is welded, constrains the cutter 21 to move out of its recess and to engage a corresponding slot 24 provided in the corresponding presser member 8 so as to cut the welded portion of the tube that is held still pressed between the presser members 7 and 8. A return spring 22 returns the cutter 21 into its normal inoperative position after it has passed over the cam 23.

The machine may be fitted, as illustrated in Fig. 13 with an equipment for dividing and sealing longitudinally the filled tubing of thermoplastic material.

This equipment consists of endless metal strips 25 and 25*a* arranged longitudinally over each other and said strips move in the direction of the arrows and the speed thereof is synchronized to the speed of the endless conveyor members of the machine shown in Figure 1. Between the moving metal strips 25 and 25*a* a filled thermoplastic tubing is introduced. The endless metal strips 25 and 25*a* are heated by means at points of their travel, for instance by electrical resistances marked 26, (and heat is thus provided to the endless metal strips) to cause them to weld the pressed together contacting walls. A cooling device constituted for instance, by nozzles 27 producing an injection of cold air, may be arranged if required at points of the travel of the endless metal strips after the welding of the thermoplastic material has been effected thereby.

Figure 14 shows somewhat diagrammatically how the current of an electric impulse generator is switched on. It is the same mechanism as that used for switching on the radio frequency generator as shown in Figure 1.

WHAT I CLAIM IS:—

1. A machine for the continuous production of pliable, filled and airtightly sealed containers from a filled tubing made of thermoplastic material, comprising a conveyor consisting of two endless conveyor members, both adapted to advance continuously at the same uniform speed and in constant direction, one strand of one conveyor member being opposed to a co-operating strand of the other conveyor member and being parallel thereto at least along a fraction of their length, pressing means transversely arranged and secured to each of the conveyor members at distances from one another which are equal to the length of the containers to be produced, the said pressing means on one conveyor member being maintained in registration with the opposed pressing means on the other conveyor member as they move along said opposed strands, the said opposed registering pressing means being caused to approach one another during their movement along said opposed strands, so that the walls of the filled tubing introduced be-

tween them are gradually brought into close contact with one another and thereafter, to exert pressure on said contacting walls and means being provided for heating said pressing means or causing them to generate heat to weld the pressed parts of the tubing during their movement, the length of the movement of the pressing means during which the pressure is maintained, being greater than the length of an individual container.

2. A machine as claimed in Claim 1, wherein the pressing members are heated only starting from a point of their travel beyond that where the walls of the tubing have been brought into close contact under pressure and for a time sufficient for welding the pressed parts together.

3. A machine as claimed in Claim 1 comprising guiding members for the pressing means along the strands, said members being located in substantial parallelism with the co-operating parallel conveyor-member strands.

4. A machine as claimed in Claim 3 wherein each guiding member has a shape such that the pressing members carried by one co-operating strand move gradually nearer the pressing members registering therewith that are carried by the other co-operating strand when the strands are about to reach the parallel fraction of their lengths.

5. A machine as claimed in Claim 1 wherein the pressure exerted by the pressing means is provided through the agency of mechanical devices.

6. A machine as claimed in Claim 1 including means for limiting the movement of the registering pressing means towards one another.

7. A machine as claimed in Claim 6 wherein the movement limiting means are adjustable.

8. A machine as claimed in Claim 1 wherein the pressing means on one conveyor member are provided with guiding means adapted to engage the registering pressing means on the other conveyor member for preventing any longitudinal shifting between the registering pressing means on the two conveyor members.

9. A machine as claimed in Claim 1 wherein the heating by the pressing means is performed through electrical means.

10. A machine as claimed in Claim 9 wherein the heating by the pressing means is performed through high frequency currents.

11. A machine as claimed in Claim 9 wherein the heating by the pressing means is performed through electrical impulses.

12. A machine as claimed in Claim 3 wherein the pressing means on either conveyor member are electrically conductive and co-operate with corresponding portions of the guiding members that are also conductive and insulated with reference to the remainder of the guiding members, said conductive portions of the guiding members for both strands being inserted in a common operative circuit.

13. A machine as claimed in Claim 12 wherein the pressing means on at least one strand are provided each with a pusher member adapted to engage a switch in the common operative circuit to close the latter only when the pressing means have entered into complete mechanical contact with the co-operating conductive portions of the guiding members, and to open said circuit before the said pressing means have reached the end of the corresponding conductive portions.

14. A machine as claimed in Claim 6 wherein the movement limiting means are constituted by an abutment that is not electrically conductive and is provided on both sides of at least one of the pressing means of each registering pair.

15. A machine as claimed in Claim 8 wherein the guiding members which are provided to keep the pressing means in registering relation are electrically insulated.

16. A machine as claimed in Claim 1 including means adapted to increase the pressure exerted by the registering pressing means on the tubing during its travel at those points where the welding is performed.

17. A machine as claimed in Claim 3 wherein the guiding members have a shape such that they provide for a movement of the registering pressing means towards one another to increase the pressure exerted on the tubing by said pressing means.

18. A machine as claimed in Claim 1 wherein a cutter member, that is normally in its receded position inside one of each pair of registering pressing means, is urged out of same and into a corresponding slot in the other registering pressing means through the welded part of the tubing held between said pressing means to sever said welded part of the tubing, said movement of the cutter member being provided by means of a cam located beyond the point of the travel of the tubing at which the part considered thereof has been welded.

19. A machine as claimed in Claim 1 fitted with an equipment for dividing and sealing a length of filled tubing longitudinally, said equipment comprising two endless metal strips for pressing and welding.

20. A machine in accordance with any of the preceding claims and as described and illustrated.

L. RADO.

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Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

FIG. 1.

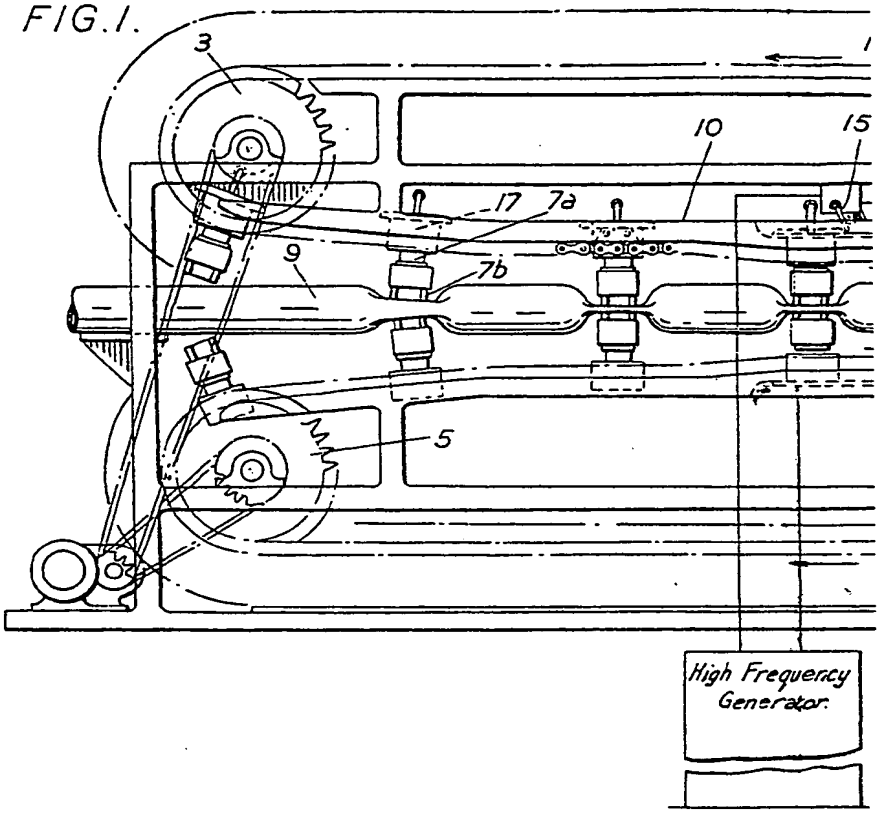


FIG. 2.

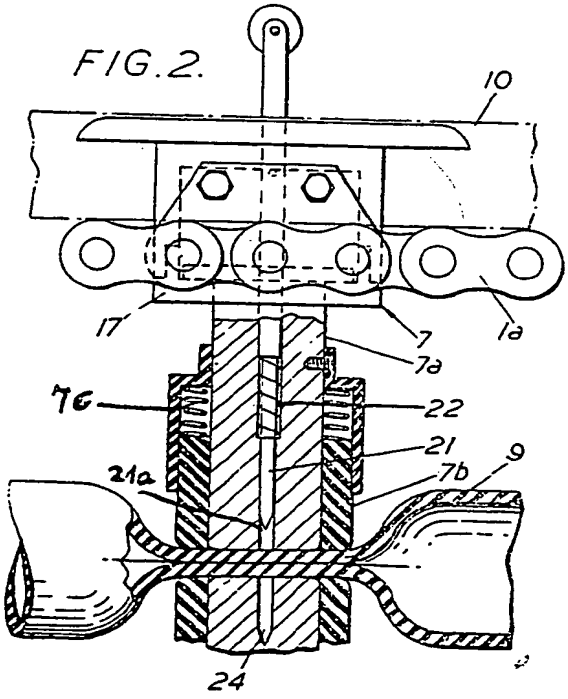
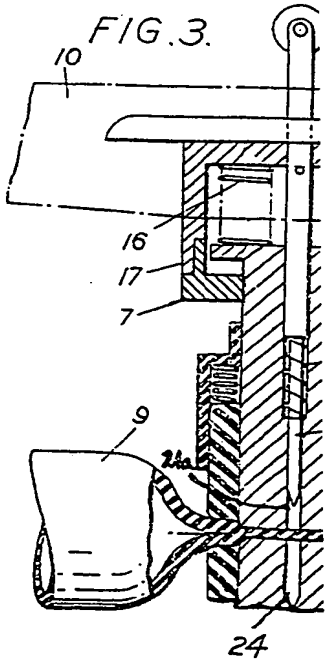


FIG. 3.



716,783 AMENDED SPECIFICATION

3 SHEETS

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SHEET 1

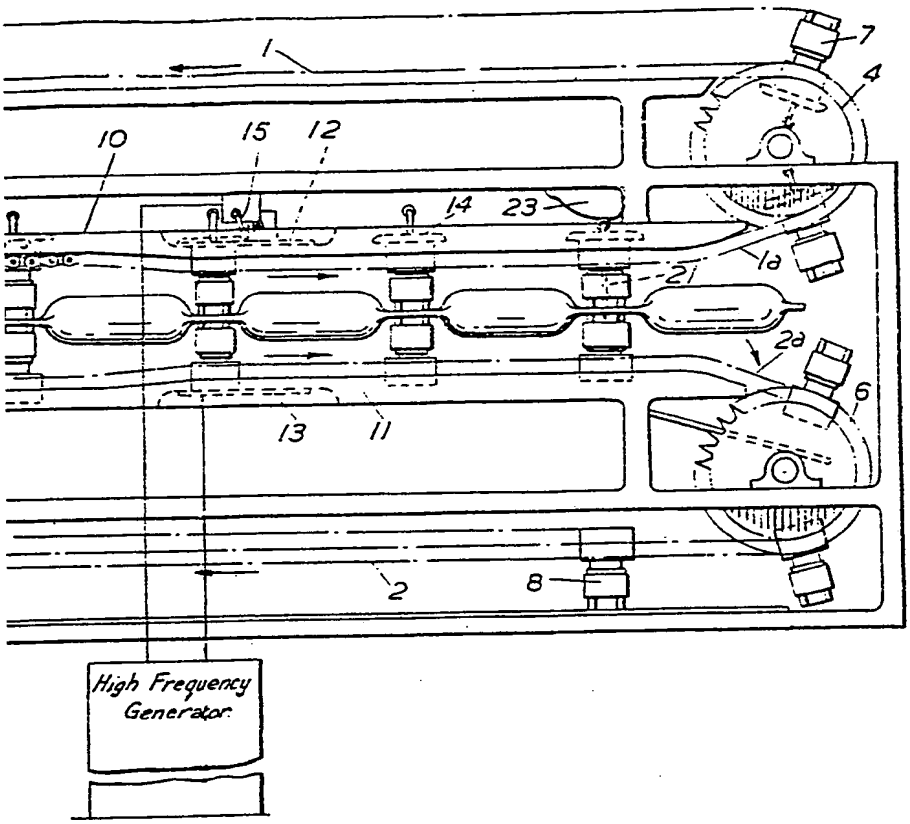


FIG. 3.

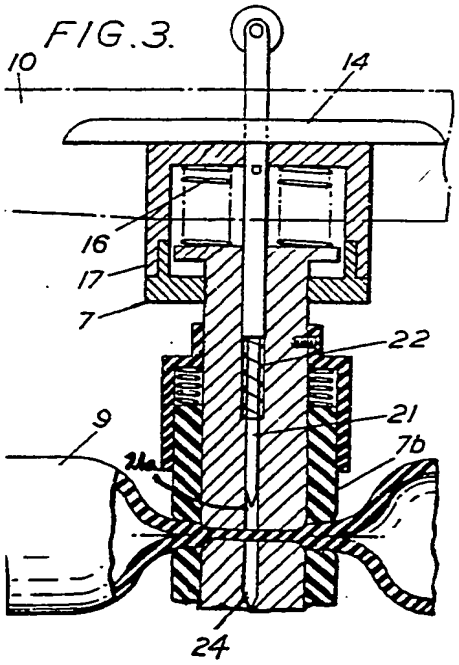
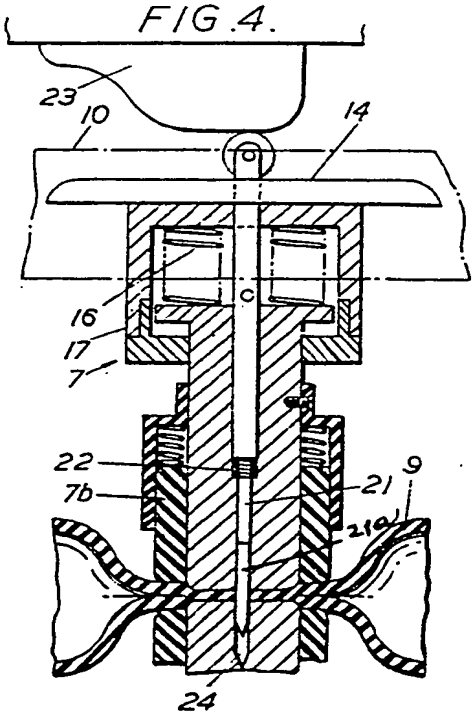


FIG. 4.



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3 SHEETS

AMENDED SPECIFICATION

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SHEET 1

FIG 1.

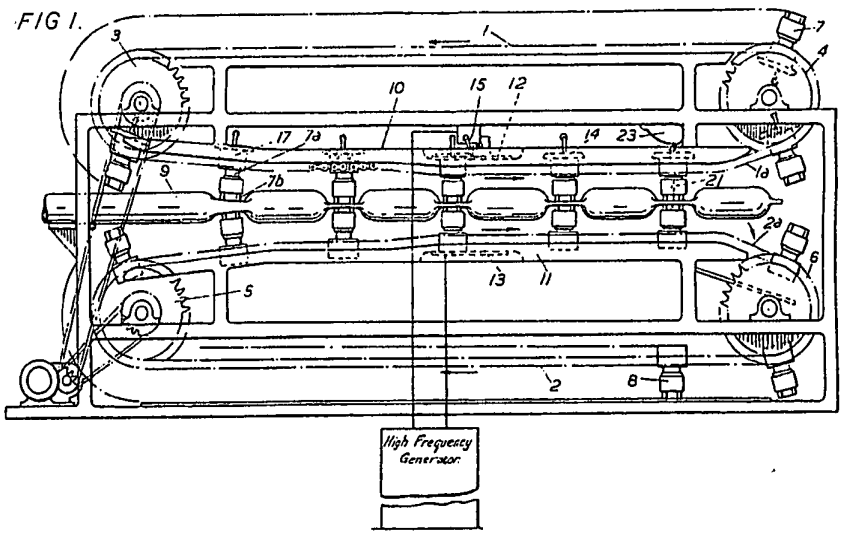


FIG.2.

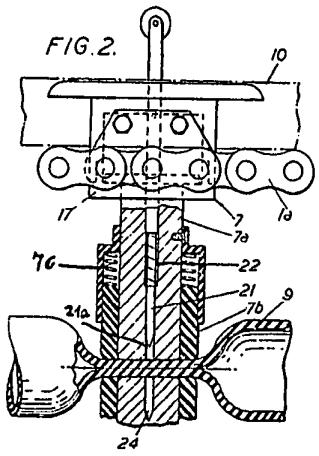


FIG.3.

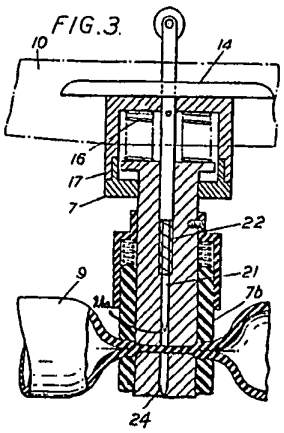


FIG.4.

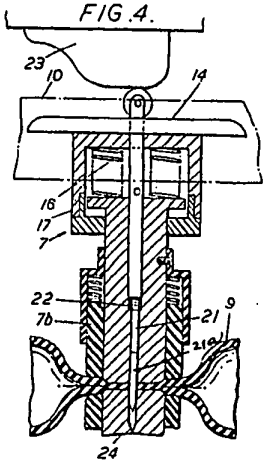


FIG. 5.

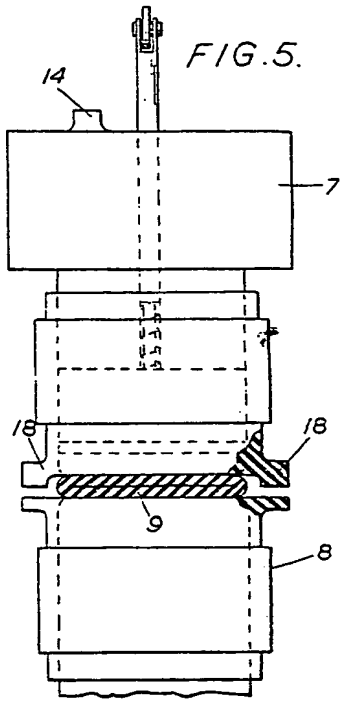


FIG. 9.

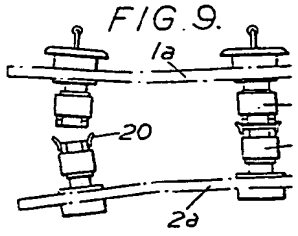


FIG. 14.

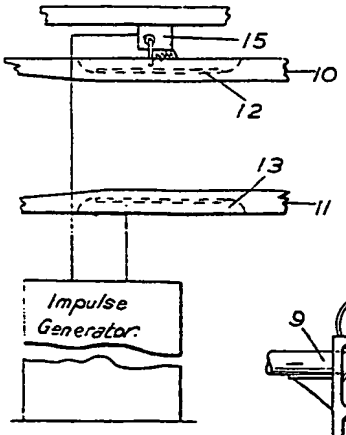
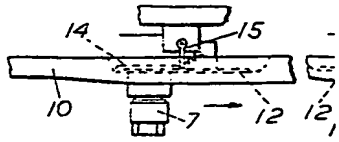
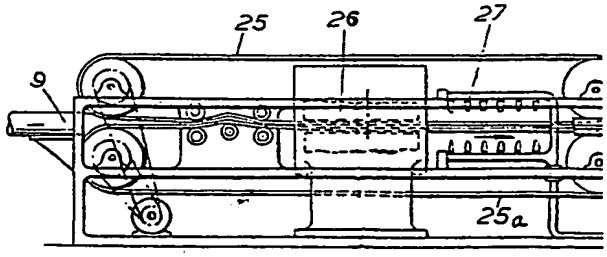


FIG. 10.





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3 SHEETS

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SHEETS 2 & 3

FIG.5.

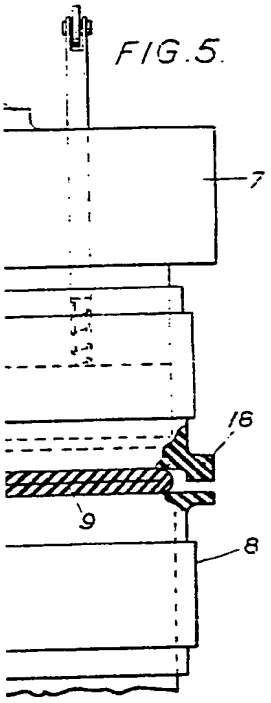


FIG.6.

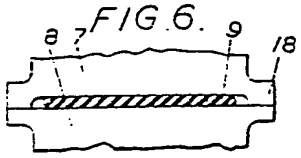


FIG.8.

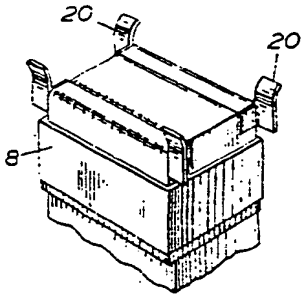


FIG.9.

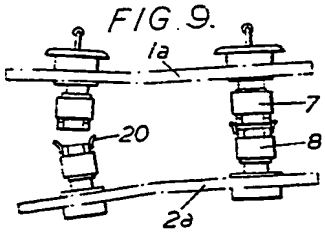


FIG.7.

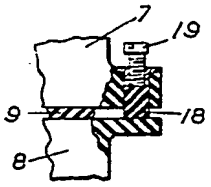


FIG.10.

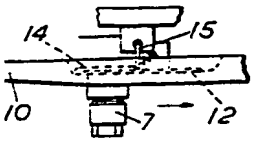


FIG.11.

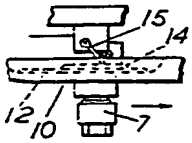


FIG.12.

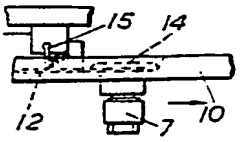
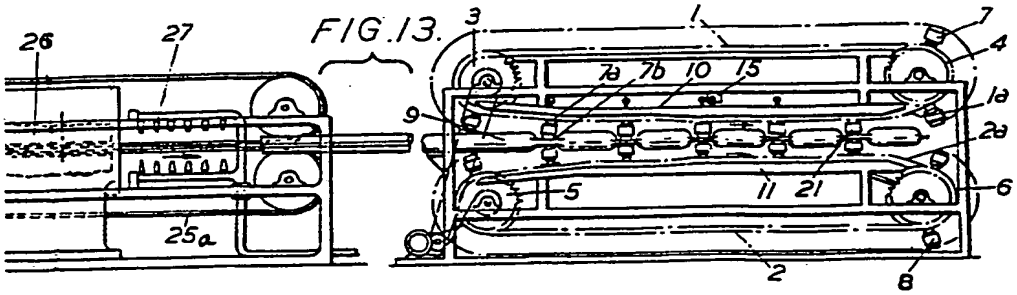


FIG.13.



716,783 AMENDED SPECIFICATION

3 SHEETS This drawing is a reproduction of the Original on a reduced scale.

SHEETS 2 & 3

FIG. 5

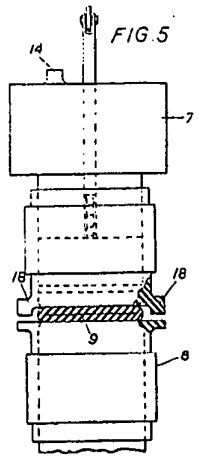


FIG. 6.

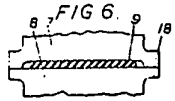


FIG. 8.

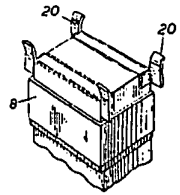


FIG. 9.

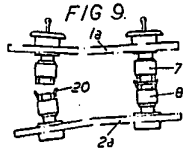


FIG. 7.

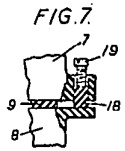


FIG. 14.

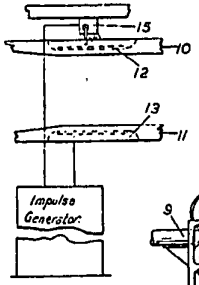


FIG. 10

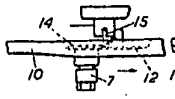


FIG. 11.

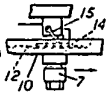


FIG. 12.

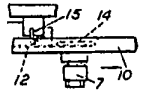


FIG. 13.